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**Technical Service Bulletin** 

| GROUP             | NUMBER                   |
|-------------------|--------------------------|
| CAMPAIGN          | 17-01-057-1              |
| DATE              | MODEL                    |
| NOVEMBER,<br>2017 | IONIQ HYBRID<br>(AE HEV) |

# SUBJECT:

# TRACTION MOTOR INSPECTION AND REPLACEMENT (SERVICE CAMPAIGN T2J)

# This bulletin is revised for changes in the operation times involving Traction Motor replace.

# **\*** IMPORTANT

\*\*\* Dealer Stock and Retail Vehicles \*\*\*

Dealers must perform this Service Campaign on all affected vehicles prior to customer retail delivery and whenever an affected vehicle is in the shop for any maintenance or repair.

When a vehicle arrives at the Service Department, access Hyundai Motor America's "Warranty Vehicle Information" screen via WEBDCS to identify open Campaigns.

# **Description:**

Certain 2017 IONIQ HYBRID (AE HEV) vehicles may experience the following symptoms as a result of an internal coolant leak within the Traction Motor:

- Check Engine and Hybrid warning lights ON with one or more of following DTC found stored:
  - P0AA6 Hybrid Battery Voltage System Isolation Fault.
  - P0A5F Drive Motor A Phase U Current High.
  - P0A62 Drive Motor A Phase V Current High.
  - o P0A65 Drive Motor A Phase W Current High.
- Vehicle may also experience reduced power at acceleration and air conditioning inoperative when the warning lights are ON.

This bulletin provides the procedure to inspect the Traction Motor and replace the Traction Motor when necessary.

# Table of Contents – TSB Service Procedure Components:

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Applicable Vehicles: Certain 2017MY IONIQ Hybrid (AE HEV) vehicles.

Circulate To: Service Manager, Warranty Manager, Service Advisors, Technicians, Fleet Repair

#### Warranty Information:

| Model    | Op Code  | Operation  | Op<br>Time | Causal<br>Part | Nature<br>Code | Cause<br>Code |
|----------|----------|--|------------|----------------|----------------|---------------|
|          | 70C060RA | COOLANT LEAKAGE<br>INSPECTION  | 1.1<br>M/H |                |                |               |
|          | 70C060RB | COOLANT LEAKAGE INSPECTION<br>AND MOTOR REPLACEMENT  | 5.3<br>M/H |                |                |               |
|          | 70C060RC | DTC CHECK, COOLANT LEAKAGE<br>INSPECTION   | 1.3<br>M/H |                |                |               |
|          | 70C060RD | DTC CHECK, COOLANT LEAKAGE<br>INSPECTION<br>AND MOTOR REPLACEMENT  | 5.5<br>M/H |                |                |               |
| (AE) HEV | 70C060RE | DTC CHECK AND DIELECTRIC<br>BREAKDOWN INSPECTION,<br>COOLANT LEAKAGE INSPECTION                          | 1.4<br>M/H | 36500-2BDB0    | E81            | ZZ3           |
|          | 70C060RF | DTC CHECK AND DIELECTRIC<br>BREAKDOWN INSPECTION,<br>COOLANT LEAKAGE INSPECTION<br>AND MOTOR REPLACEMENT | 5.6<br>M/H |                |                |               |
|          | 70C060RG | DTC CHECK AND DIELECTRIC<br>BREAKDOWN INSPECTION,<br>MOTOR REPLACEMENT                                   | 5.1<br>M/H |                |                |               |

**NOTE 1:** Submit Claim on Campaign Claim Entry Screen.

**NOTE 2:** If a part is found in need of replacement while performing this Service Campaign and the affected part is still under warranty, submit a separate warranty claim using the same Repair Order. If the affected part is out of warranty, submit a Prior Approval Request for goodwill consideration prior to performing the work.

**NOTE 3:** Additional coolant replacement, if necessary, is included in the labor Op Times.

**Parts Information:** 

| PART NAME      | FIGURE / PART NUMBER | REMARK  |
|----------------|----------------------|---|
| TRACTION MOTOR | a6500-2BDB0QQH       | Order only when<br>confirmed <b>FAILED</b> by the<br>inspection result. |

# Special Service Tools:

| PART NAME            | FIGURE / PART NUMBER                       | REMARK   |
|----------------------|--|--|
| AIR BLEEDING<br>TOOL | <image/> <section-header></section-header> | NOTE: This tool<br>cannot be claimed to<br>the campaign.<br>It's an existing required<br>Dealer Tool.<br>Order from Bosch<br>866-539-4248 if your tool<br>is misplaced.                    |
| ADAPTER TOOL         | IK373-G5100QQH                             | NOTE: Dealer will be<br>shipped one(1) kit free<br>of charge.<br>Keep the kit together<br>with your Air Bleeding<br>Tool.<br>Additional kits can be<br>ordered through your<br>facing PDC. |

# General Service Procedure:

The following flowchart is a summary of the general inspection and repair procedure:



# A). Dielectric Isolation Breakdown Inspection Procedure:

**NOTE**: The following inspection procedure only applies for vehicles with DTC P0AA6, P0A5F, P0A62 or P0A65 found stored:

1. Connect GDS with Ignition ON and vehicle <u>not</u> operating in Ready mode.

Select **Isolation Breakdown Detection Function** within S/W Management section under HEV Battery System as shown in these screens:

| S/W Management                         |            |                        | S/W Management                                 | ₽ |
|--|------------|------------------------|--|---|
| Systems Components                     | Unfold All | Isolation Breakdow     | n Detection Function                           |   |
| Resetting Adaptive Values              |            | Purpose                | To monitor isolation breakdown                 |   |
| Auto Detected Configuration Reset      |            |                        |  |   |
| Read VIN                               |            | Enable Condition       | 1. Ignition Switch On<br>2. HEV/EV : Not Ready |   |
| Write VIN                              |            |                        |  |   |
| ETC TEST(Option)                       |            | Concerned<br>Component | Battery Management System(BMS)                 |   |
| Alternator TEST                        |            | Concerned DTC          | -  | _ |
| Evap. Leakage Test                     |            |                        |  |   |
| HEV Motor Control System               |            | Fail Safe              | -  |   |
| System Identification                  |            | Etc                    | -  |   |
| Motor/HSG Resolver Calibration         |            |                        |  |   |
| Electric Water Pump Control            |            |                        |  |   |
| HPCU (MCU/GCU) self-diagnosis function |            |                        |  |   |
| HCU/Low DC-DC Converter                |            |                        |  |   |
| HEV Battery System                     |            |                        |  |   |
| System Identification                  |            |                        |  |   |
| Isolation Breakdown Detection function |            |                        |  |   |
| SOC Calibration                        |            |                        |  |   |
| Inspection of 12V Battery Status       |            |                        |  |   |
| ■ 12V Battery SOC Correction Function  |            |                        | ОК   |   |

2. After result completes in approx. 3 minutes, one of the following screen results will occur:

 FAILED MOTOR is confirmed by below result:
 -> Go to section-D "Replace Traction Motor." (page 13 of this TSB)

 S/W Management
 S/W Management

 Isolation Breakdown Detection function
 Isolation Breakdown Detection function

 Isolation breakdown detection function completed.
 Isolation breakdown detection function completed.

 The expected parts for isolation breakdown have been detected as follows.
 Isolation breakdown detection function completed.

 \* 3-phase unit of the motor (motor, 3-phase unit of the inverter, high voltage cable)
 Isolation breakdown has been detected.

**NOTE:** Contact Techline if any result appears other than the above screens.

**PASSED** - No issue confirmed by this test:

-> Go to the next section-B "Traction

Motor Coolant Leakage Inspection"

#### SUBJECT:

# B). Traction Motor Coolant Leakage Inspection Procedure:

1. Per the HEV "General Safety Information and Caution Notice" wear insulated safety gloves when working on high voltage components that have an orange connector and cable color.

Disconnect the high voltage safety plug by accessing the plate under the right side corner of the rear seat as shown.

# WARNING

Be sure to read and follow the "General Safety Information and Caution" notice before doing any work related with the high voltage system.

Failure to follow the safety guidelines may result in serious electrical injuries.



2. Carefully remove the hybrid coolant reservoir cap and set it aside.



Never remove the cap when engine is hot. Serious scalding could be caused by hot fluid escaping under high pressure.







- 3. a) Raise vehicle on a lift.
  - b) Remove the engine undercover.
  - c) Fully loosen the drain plug and fully drain the hybrid coolant (A) into a drain pan.
  - d) Fully close the drain plug after coolant has stopped draining.

- 4. a) Lower vehicle from the lift.
  - b) Remove the engine cover/air filter assembly.
  - c) Disconnect HSG sensor connector (B).

- 5. a) Loosen the 2 10mm bolts of the HSG coolant feed pipe from the intake manifold.
  - b) Separate HSG coolant hose from the HSG coolant feed pipe as shown.





- 6. a) Raise vehicle on the lift.
  - b) From under the vehicle, disconnect the coolant hose from the Traction Motor coolant inlet pipe.
  - c) Allow coolant to drain from the Traction Motor inlet pipe and hose into a drain pan.
  - d) Leave a shallow drain pan in place on the floor to continue to catch additional coolant that will drain out in step-7.



- 7. a) Lower vehicle from the lift.
  - b) Blow shop air through the HSG coolant feed pipe to fully blow out residual coolant from the Traction Motor inlet pipe to the drain pan left under the vehicle from step-6.





- 8. a) Raise vehicle on the lift.
  - b) Connect Adapter Tool hose with the plug to the Traction Motor coolant inlet pipe.
  - c) Ensure that the hose is secure with the provided clamp so as not to leak any air.



- 9. a) Lower vehicle from the lift.
  - b) Connect Adapter Tool hose with the quick connect fitting to the HSG coolant feed pipe and secure with provided clamp so as not to leak any air.

- 10. Setup the Air Bleeding Tool to perform the 3-Bar Air Leak Test as follows:
  - a) Install the hose (C) into the Adapter Tool quick connect fitting that was attached to the HSG coolant feed tube.
  - b) Pull up on the pressure valve (D) and rotate it counter clockwise all the way to the maximum position (lowest pressure).
  - c) Install pressurized shop air hose quick connect then open the valve (E).
  - d) Set pressure to 3.0 Bar by pushing in and rotating the pressure valve (D) clockwise.
  - e) Close the valve (E) once pressure is set at 3.0 Bar and remove the shop air hose.
  - f) Keep valve (E) closed for 5 minutes and observe the final pressure result. Refer to next page for criteria of GOOD/FAILED result.
  - g) After test result is concluded, relieve the pressure from the Air Bleeding Tool by rotating the valve (E) fully counter clockwise all the way to its maximum position.
  - h) Remove the Air Bleeding Tool hose (C) from the Adapter Tool hose.







#### Air Leak Test Result:

- GOOD: Holds pressure after 5 minutes within 0.2 Bar of the original setting.:
  - Traction Motor is OK.
  - Proceed to step 11.
- FAILED: Pressure falls more than 0.2 Bar and ends up dropping below 2.8 Bar after 5 minutes:
  - Traction Motor has an internal coolant leak failure and must be replaced per section-D. (page 13 of this TSB)
  - Complete Step-11 then replace the Traction Motor per Shop Manual procedure.



# NOTICE

In event of FAILED result confirm that the adapter tool connections were tight fitting and recheck the Air Leak test result if necessary.

- 11. a) Remove the Tool Adapter from the HSG coolant feed tube. Return the Tool Adaptor back into its storage bag.
  - b) Reinstall the coolant hose back securely to HSG coolant feed tube and the 2 bolts to the manifold.

*Tightening torque :* 18.6 - 23.5 N.m (1.9 - 2.4 kgf.m, 13.7 - 17.4 lb-ft)

- c) Raise vehicle on lift and remove the Tool Adaptor from the Motor inlet coolant tube. Return the Tool Adapter back into the Kit storage bag.
- d) According to the result of the Step-10 Air Leak Test:
  - i. "GOOD" Air Leak Test Result: -> Go to steps 12-16 prior to filling and bleeding hybrid coolant.
  - "FAILED" Air Leak Test Result: -> Go to section-D Replace Traction Motor. Note: Steps 12-14 below will be performed to fill and bleed hybrid coolant after the motor is replaced.
- 12. Reinstall the coolant hose securely to the Traction Motor inlet coolant tube.
- 13. Reinstall the engine undercover, then lower the vehicle down from the lift.
- 14. Reinstall the engine cover/air filter assembly.
- 15. Reinstall the high voltage battery safety plug.
- 16. Go to the next section-C "Procedure to Fill Coolant and Bleed Air".

# C). Procedure to Fill Coolant and Bleed Air:

1. Fill the reservoir with coolant and water mix at 45 ~ 50% mixture up to the MAX mark. Premix the water and coolant in a clean bucket prior to pouring it in the reservoir.



- Use only genuine antifreeze/coolant. Do not mix brands.
- For best year round corrosion protection the coolant must be mixed to 45% minimum. Greater than 55% will not provide sufficient protection against corrosion and freezing.
- Perform the GDS Electric Water Pump (EWP) bleeding procedure per below steps and screenshots. Refill the hybrid coolant reservoir to between MIN and MAX while coolant is circulating.
  - From main GDS Mobile screen, select GDS "S/W Management".
  - Within "S/W Management" screen, select the "Components" tab, then choose the "Electric Water Pump Control" option.
  - With IGN ON but with READY Mode OFF, press IGN button twice without pressing the brake pedal. Select OK in the following screens to proceed.

| S/W Management  |                       |                            | S/W Management  |
|---|-----------------------|----------------------------|---|
| Systems Components  | Unfold All            | • Electronic Water Pur     | mp Operation  |
| Engine Control  |                       | Purpose                    | To bleed air and circulate the water after repair work in<br>done on HSG/HPCU or Electric Water Pump(EWP) |
| HEV Motor Control System  | 16                    |                            | 1 Engine Off  |
| After Replacing Electronic Water Pump(EWP)  |                       | Enable Condition           | 2. Ignition Swduh Gn  |
| Electric Water Pump Control   | 8                     | Contraction and the second | SHODIC  |
| After Replacing Motor Control Unit(MCU)   |                       | Concerned<br>Component     | Motor Control Unit(MCU), Electric Water Pump(EWP)   |
| Motor/HSG Resolver Calibration  | 8                     | Concerned DTC              | -   |
| After Replacing Resolver Sensor   |                       |                            |   |
| Motor/HSG Resolver Calibration  | Ð                     | Fail Safe                  |   |
| After Replacing Hybrid Starter Motor Generator(HSG)   |                       | Etc                        |   |
| Motor/HSG Resolver Calibration  | 8                     |                            |   |
| Electric Water Pump Control   | 8                     |                            |   |
| After Replacing Hybrid Motor Cooling Related Components   |                       |                            |   |
| Electric Water Pump Control   | 8                     |                            |   |
| etc.  |                       |                            |   |
| System Identification   | 8                     |                            |   |
| HCU/LDC   | 38                    |                            |   |
| HEV Battery System  | (B)                   |                            |   |
| Automatic Transaxle   |                       |                            | ок  |
| S/W Management<br>Electric Water Pump Control<br>• [Electronic Water Pump (EWP) Operation]  |                       |                            |   |
| This function is used when the electric water pump (EWP) is operated<br>order to discharge air by circulating coolant after replacing parts (inve<br>LDC, EWP, HSG, OBC, radiator, horse, etc) related to circulation and or<br>of high voltage system in a hybrid vehicle. | in<br>rter,<br>soling |                            |   |
| =[ Condition ]  | 22                    |                            |   |
| IG On , HEV/EV Not Ready     IG On , HEV/EV Not Ready     NO DTC (EWP related code : PDC73)     Refill the coolant to the reservoir tank  |                       |                            |   |
| Press IOK button to continue.   |                       |                            |   |

3. Bleeding of the hybrid coolant system is complete when the operating sound of the EWP becomes weak and there are no air bubbles seen in the reservoir tank. (normally takes 3-5 minutes).

# NOTICE

After air bleeding is complete, make sure that coolant in the reservoir flows without air bubbles during the EWP actuation. If the coolant flow is not seen or air bubbles are still present, repeat steps 1-2 again.

Failure to check that air is completely bled from the hybrid coolant system may result in vehicle return with "Low Coolant Warning" light.

4. After air bleeding is complete, stop the GDS Mobile EWP bleeding function. Add coolant to the "MAX" level, and install the reservoir cap.

| S/W Management   | S/W Management  |
|--|---|
| Electric Water Pump Control  | Electric Water Pump Control   |
| [Electronic Water Pump (EWP) Operation ]   | * [Electronic Water Pump (EWP) Operation]   |
| < Matters to be checked while operating EWP >  | Electronic water pump (EWP) operation has been completed.   |
| 1. Check with the eyes if the coolant in the reservoir tank is circulating   | < Matters to be confirmed after EWP operation completed >   |
| 2. Refill coolant if insufficient. Operate EWP for 3 minutes.  | 1. Check if the coolant level in the reservoir tank is in between MAX and MIN   |
| <ol> <li>If coolant has air bubbles while being circulated, wait 30 seconds after<br/>operation is completed and carry out the function again</li> </ol> | <ol><li>If the coolant in the reservoir tank had air bubbles while EWP was<br/>operating, wait 30 seconds after the operation is completed and carry out<br/>FMP seconds or an end.</li></ol> |
| Press Cancel button to stop the operation.   | EWP operation again   |
|  | Press OX button.  |
| [[ Kunning ]] 15 second(s) Elapsed   |   |
| Cancel   | ОК  |

5. The "Traction Motor Coolant Leakage Inspection" Procedure is complete.

### D). Procedure to Replace the Traction Motor in the section Hybrid Motor System:

1. Follow the Shop Manual Procedure located at below:



- 2. After replacement be sure to follow section-C "Procedure to Fill Coolant and Bleed Air".
- 3. Perform these 4 GDS Mobile Calibrations in specific order as indicated below:



- 4. Clear DTCs and Bluelink.
- 5. Perform short test drive to confirm normal operation and check after test drive that the hybrid coolant level is still OK. Confirm that no DTC reoccurred.
- 6. Procedure is complete.